We claim:

1. A method for converting methane to methanol by partial oxidation comprising:

flowing a mixture of methane and oxygen into a capillary tube having an inflow end and an outflow end;

negatively biasing the capillary tube relative to an anode;

striking a plasma jet flowing from the outflow end of the capillary tube;

partially oxidizing the methane into methanol in the plasma jet in a reaction zone of predetermined length; and

flowing the methanol in the plasma jet past the anode.

2. The method of claim 1 where flowing a mixture of methane and oxygen into a capillary tube further comprising mixing the methane and oxygen with an inert carrier and flowing the mixture into the capillary tube.

3. The method of claim 1 where negatively biasing the capillary tube relative to the anode comprising negatively biasing the capillary tube with a DC voltage.

4. The method of claim 1 where flowing the methanol in the plasma jet past the anode comprises flowing the methanol into an anode tube aligned with the capillary.

5. The method of claim 4 further comprising isolating the cathode, reaction zone, and anode in a protective package.

6. The method of claim 1 where flowing the methanol in the plasma jet past the anode comprises flowing the methanol through the anode.

7. The method of claim 1 where the anode is a screen and flowing the methanol in the plasma jet past the anode comprises flowing the methanol through the anode screen.

8. The method of claim 1 further comprising condensing the methanol from the reaction zone.

9. The method of claim 8 further comprising separating the methanol from other condensed products form the reaction zone.

10. The method of claim 1 further comprising scaling the method up by flowing a mixture of methane and oxygen into a plurality of capillary tubes, each having an inflow end and an outflow end, negatively biasing the plurality of capillary tube relative to at least one anode, striking a plasma jet flowing from the outflow end of each of the plurality of capillary tubes, partially oxidizing the methane into methanol in the plasma

jets in a reaction zone of predetermined length, and flowing the methanol in the plasma jets past the at least one anode..

11. An apparatus for converting methane to methanol by partial oxidation comprising:

a source of methane;

a source of oxygen;

a capillary tube having an outflow end and an inflow end communicating with the sources of methane and oxygen;

an anode proximate to but spaced from the capillary tube;

a voltage source for negatively biasing the capillary tube relative to the anode;

a plasma jet flowing from the outflow end of the capillary tube;

a reaction zone for partially oxidizing the methane into methanol in the plasma jet; and

a collector of the methanol in the plasma jet.

12. The apparatus of claim 11 further comprising a source of an inert carrier and a mixer for mixing the methane and oxygen with the inert carrier and where the mixer communicates with the inflow end of the capillary tube.

13. The apparatus of claim 11 where the voltage source comprises a DC voltage source.

14. The apparatus of claim 11 where the anode comprises an anode tube having an inflow end aligned with the outflow end of the capillary.

15. The apparatus of claim 14 further comprising an isolating protective package enveloping the cathode, reaction zone, and anode.

16. The apparatus of claim 11 where collector comprises an aligned hollow anode arranged and configured to receive the methanol flowing in the plasma jet.

17. The apparatus of claim 11 where the anode is a screen and collector comprises a manifold in which the anode screen is disposed and which is communicated to the outflow end of the capillary tube.

18. The apparatus of claim 11 further comprising a condenser in communication with the collector.

19. The apparatus of claim 18 further comprising a separator for separating the methanol from other condensed products form the reaction zone.

20. The apparatus of claim 11 further comprising a plurality of capillary tubes, each having an inflow end and an outflow end, at least one anode proximate to but spaced from each of the plurality of the capillary tubes, a plurality of plasma jets flowing from

the outflow end of each of the plurality of capillary tubes, a reaction zone of predetermined length for partially oxidizing the methane into methanol in each of the plurality of plasma jets, and where the collector collects the methanol form each one of the plurality of plasma jets.

21. The apparatus of claim 20 where the plurality of capillary tubes are organized into an array of capillary tubes with a corresponding anode.

22. The apparatus of claim 21 further comprising a plurality of arrays coupled together in serial or parallel topologies.

23. The apparatus of claim 22 further comprising a condenser in communication with the collectors of each of the plurality of arrays.